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(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 831 469 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
25.03.1998 Bulletin 1998/13

(51) Int Cl.[6]: **G11B 7/12**, G11B 7/135

(21) Application number: **97307388.5**

(22) Date of filing: **22.09.1997**

(84) Designated Contracting States:
AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE

(30) Priority: **24.09.1996 KR 9642120**

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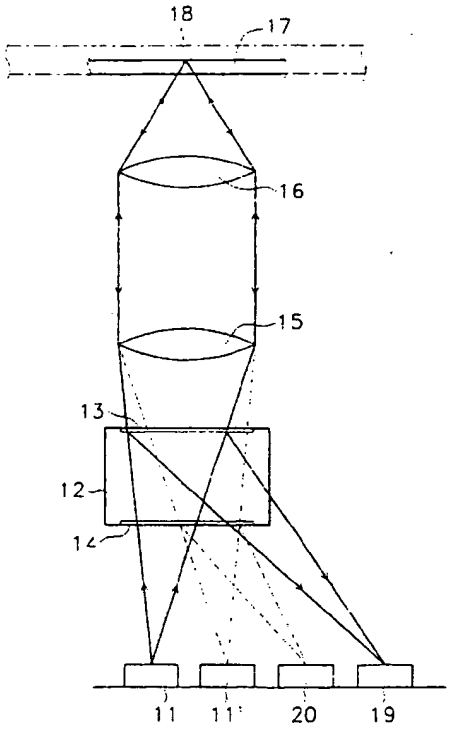
(54) Hologram optical pick-up using two laser sources

(57) Disclosed is a hologram optical pick-up using two laser sources (11, 11'). In a hologram optical pick-up according to the present invention, laser beams having different wavelength, which are emitted from first and second laser sources (11, 11') and focused by an objectiveive lens (16) on a disc (17, 18), are reflected at a surface of the disc (17, 18). The reflected laser beams are diffracted by a first hologram (13) or a second hologram (14), and then received by a first photo detector (19) or a second photo detector (20). Accordingly, laser beams having different wavelengths according to a thickness and a recording surface of the disc are emitted by the first laser source (11) or the second laser source (11') to compensate for aberration of laser beam due to the thickness of the disc (17, 18). Thereby, the hologram optical pick-up can reproduce data from discs (17, 18) having different recording surface without loss of data. Also, the hologram optical pick-up can record and reproduce data on/from any disc under best environment and can increase efficiency of the laser beam.

Fig. 2



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stroyed due to properties of a phase changeable material.

Furthermore, in the conventional optical pick-up, the optical environment generally is adjusted for the digital video disc which, having a thinner thickness, presents the problem in that it is impossible to optimally reproduce data from the compact disc and that during the reproduction of data from the compact disc, a loss of the laser beams which arrives at the photo detector increases to result in deteriorating the reproducing signal.

Therefore, the present invention has been made with a view to overcome or reduce the above described problems of the prior art, and accordingly it is an aim of preferred embodiments of the present invention to provide an optical pick-up which has an improved hologram, for recording and reproducing data on and from discs having different thickness and discs, for example, a recordable compact disc, an magneto optical disc, and the like, having different recording material.

It is another aim of embodiments of the present invention to provide an optical pick-up using a hologram, capable of recording and reproducing data on and from any disc having different thickness under suitable environment.

According to a first aspect, the present invention provides a hologram optical pick- up using two laser sources comprising: first and second laser sources for respectively emitting laser beams having different wavelengths; an objectiveive lens for focusing the laser beams emitted from the first and second laser source on surfaces of discs having different thickness; a hologram plate having first and second holograms formed on both sides thereof, the first and second holograms respectively diffracting the laser beams which are emitted from the first and second laser sources and reflected by discs; and first and second photo detectors for receiving the laser beams which are reflected by the discs and diffracted by the first and second holograms so as to detect signals.

The first laser source preferably emits a laser beam having a wavelength of 670 nm and the second laser source emits a laser beam having a wavelength of 780 nm.

The discs having different thickness may include a digital video disc and a compact disc or a digital video disc and a recordable compact disc.

Preferably, the first and second laser sources and the first and second photo detectors are disposed on the same surface.

Preferably, the first hologram only diffracts the reflected laser beam of the first laser source corresponding thereto and the second hologram only diffracts the reflected laser beam of the second laser source corresponding thereto.

For a better understanding of the invention, and to show how embodiments of the same may be carried into effect, reference will now be made, by way of example, to the accompanying diagrammatic drawings, in which:

Figure 1 is a schematic constructional view of a conventional optical pick-up using a hologram; and

Figure 2 is a schematic constructional view of an optical pick-up according to a preferred embodiment of the present invention, in which holograms are used for diffracting laser beams.

A preferred embodiment of the present invention will be described in detail with reference to the accompanying drawings.

Figure 2 schematically illustrates an optical pick-up according to a preferred embodiment of the present invention. The hologram optical pick-up has two laser diodes for respectively emitting laser beams having different wavelengths as laser sources. When recording and reproducing the data on and from disc, the hologram optical pick-up selects a laser diode having a suitable wavelength for the disc. As shown in Figure 2, the hologram optical pick-up includes first and second laser diodes 11 and 11', a hologram plate 12 having first and second holograms 13 and 14 at both sides thereof, a collimating lens 15, an objectiveive lens 16, and first and second photo detectors 19 and 20.

Reference numerals 17 and 18 indicate discs having different thicknesses from each other. A thinner disc 17 is a digital compact disc, and a thicker disc 18 is a compact disc or a recordable compact disc. Of course, only one of discs 17 and 18 is loaded into the optical pick-up apparatus in order for the hologram optical pick-up to record and reproduce data on and from the selected disc.

The first and second laser diodes 11 and 11' respectively emit laser beams having different wavelengths. That is, the first laser diode 11 emits a laser beam having a wavelength of 670 nm for the digital video disc 17 and the second laser diode 11' emits a laser beam having a wavelength of 780 nm for the compact disc or the recordable compact disc. The first and second laser diodes 11 and 11' are disposed on the same surface together with the first and second photo detectors 19 and 20.

A transparent substrate such as glass, is used as the hologram plate 12 and has the first and second holograms 13 and 14 formed at both sides thereof. The first and second holograms 13 and 14 respectively diffract the laser beams when the laser beams respectively emitted from the first and second laser diode 11 and 11' are reflected by the surface of discs. That is, the first hologram 13 diffracts the laser beam which is emitted from the first laser diode 11 and reflected by a surface of the thinner disc 17 such as the digital video disc. At this time, the laser beam which is emitted from the second laser diode 11' and reflected by the surface of the thinner disc 17 passes through the first hologram 13 without diffraction. In the case of diffracting the laser beam by using the second hologram, the second holo-

spectively emiting laser beams having different wavelengths;

an objectiveive lens (16) for focusing said laser beams emitted from said first and second laser sources on surfaces (11, 11') of discs (17, 18) having different thickness;

a hologram plate (12) having first and second holograms (13, 14) formed on both sides thereof, said first and second holograms (13, 14) respectively diffracting said laser beams which are emitted from said first and second laser sources (11, 11') and reflected by said discs (11, 11'); and

first and second photo detectors (19, 20) for receiving said laser beams which are reflected by said discs (17, 18) and diffracted by said first and second holograms (13, 14) so as to detect signals.

2. A hologram optical pick-up using two laser sources as claimed in claim 1, wherein said first laser source (11) emits a laser beam having a wavelength of 670 nm and said second laser source (11') emits a laser beam having a wavelength of 780 nm.

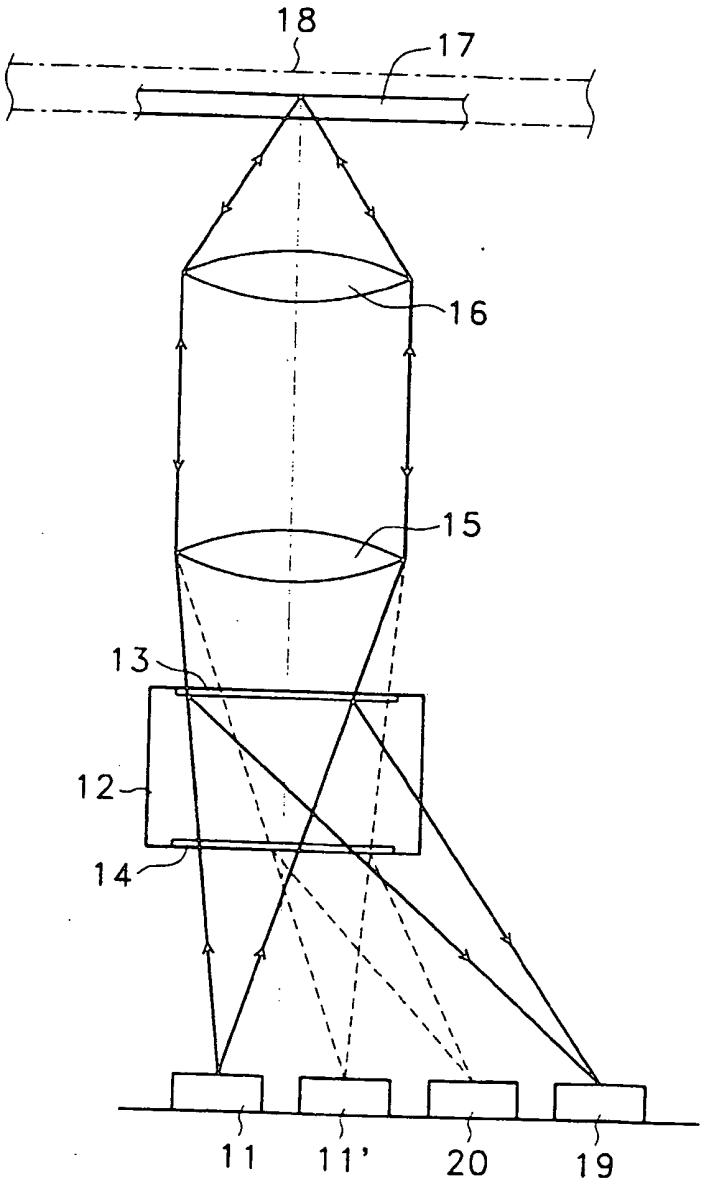
3. A hologram optical pick-up using two laser sources as claimed in claim 2, wherein discs having different thickness include a digital video disc (17) and a compact disc (18).

4. A hologram optical pick-up using two laser sources as claimed in claim 2, wherein discs having different thickness include a digital video disc (17) and a recordable compact disc (18).

5. A hologram optical pick-up using two laser sources as claimed in any of the preceding claims, wherein said first and second laser sources (11, 11') and said first and second photo detectors (19, 20) are disposed on the same surface.

6. A hologram optical pick-up using two laser sources as claimed in any of the preceding claims wherein said first hologram (13) only diffracts said reflected laser beam of said first laser source (11) corresponding thereto and said second hologram (14) only diffracts said reflected laser beam of said second laser source (11') corresponding thereto.

Fig. 2



(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 831 469 A3

(12) EUROPEAN PATENT APPLICATION

(88) Date of publication A3:
05.08.1998 Bulletin 1998/32

(43) Date of publication A2:
25.03.1998 Bulletin 1998/13

(21) Application number: **97307388.5**

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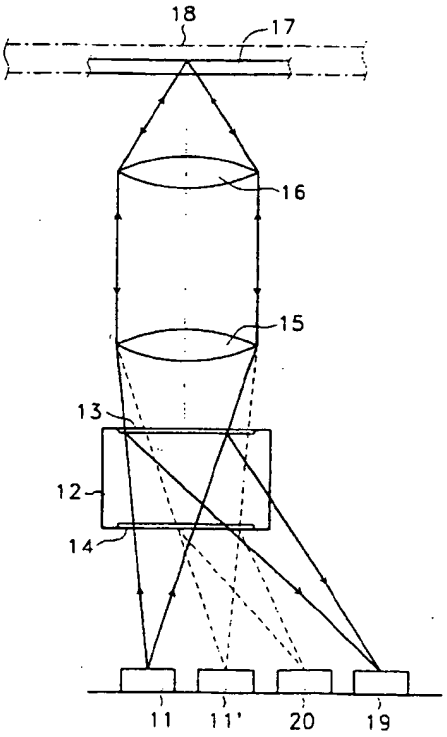

EP 0 831 469 A3